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82989 Gas Valve Ti/Lx400, Tft300-399

Applicable Boiler Models

- Ti400
- Lx400
- Tft300
- Tft399 (only serial numbers that are pre s/n 20915)

Kit Contents

- 82989 Gas valve

Tools Required

- Pipe Wrench (for gas line)
- Adjustable Wrench (for gas line union)
- 5/16" Nut Driver
- Phillips #2 and #1
- Torx T40 Screwdriver
- Slotted screwdriver
- Combustion Analyzer



Figure 1, Gas Valve



The installation of this gas valve must be performed by a qualified gas technician in accordance with these instructions. Installing this valve without the proper background and training is hazardous and may result in property damage serious injury or death.

Replacement Instructions

- 1) Shut off the gas supply to the boiler.
- 2) Remove the gas line from the gas valve.
- 3) Remove the gas valve harness and feedback tube from the gas valve.
- 4) Remove the gas valve from the boiler. Use care to not drop the orifice or O-rings, and ensure they are in the same orientation when the new valve is installed.
- 5) Remove the 4 Phillips head screws securing the gas line adapter: take note of the orientation and set aside. The gas line adapter, O-ring, and screws will be reused during re-assembly.
- 6) Prior to installing the new valve use the **Throttle Screw** (Figure 2) to adjust it to the fully open position, as illustrated to the right. The Throttle Screw on this valve is a geared butterfly valve with a 4:1 ratio. Adjusting the Throttle Screw 4 complete turns will return the valve to the original location, 2 turns from fully open will completely close the valve.
- 7) Install the gas line adapter on the new valve.

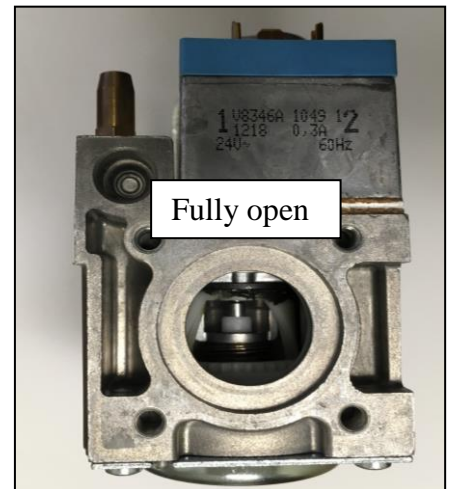


O-ring - Failure to properly re-install the gas line adapter O-ring will result in gas leakage which may cause property damage, serious injury, or death.

- 8) Pre-adjust the **Offset Screw** by turning ¼ turn in (clockwise); see Figure 2. Note: the cap must be removed to access the Offset Screw.
- 9) Reinstall the new valve in the reverse order it was removed and the **Combustion Calibration Procedure** detailed on the following pages.



Feedback Tube – Reconnect the tubing from the air-inlet to the gas valve feedback port. Failure to properly reconnect the feedback tube will negate the boiler's blocked vent safety shutoff mechanism, and could lead to incorrect combustion resulting in property damage, serious injury or death.



Fully open

Combustion Calibration Procedure

To calibrate burner combustion, perform the following procedure using a calibrated combustion analyzer capable of measuring CO₂ and CO from a Natural Gas or Propane burning appliance:

1. **Set analyzer** to the appropriate fuel (Natural Gas or Propane).
2. **Gas Line Pressure Test** – monitor gas line pressure throughout all combustion tests and verify it is maintained within tolerance. See *Gas Line Pressure Test* below.
3. **Set Throttle Screw** – operate burner to the maximum modulation rate (see Table 2); set combustion according to Table 1 using the Throttle Screw; allow time for the analyzer readings to stabilize between adjustments – record CO₂ value. See *Throttle Screw Adjustment* below.
4. **Set Offset Screw** – operate burner to the minimum modulation rate (see Table 2); using the Offset Screw, set the CO₂ to 0.4-0.8% lower than the value obtained during the maximum modulation rate test (e.g. if CO₂ at Max = 9.5%, then CO₂ at Min must = 8.8-9.1%). See *Offset Screw Adjustment* below.



Combustion Calibration is mandatory upon installation and during each annual service. Failure to perform the Combustion Calibration in accordance with these instructions may result in incorrect combustion leading to burner damage or excessive Carbon Monoxide concentrations causing property damage, personal injury or death.



Carbon Monoxide - Never leave the unit operating while producing Carbon Monoxide (CO) concentrations in excess of 175 ppm. Failure to follow this warning may result in serious injury or death.

Throttle Screw Adjustment

The gas valve Throttle Screw (see Figure 2) is used to calibrate the CO₂ concentration with the burner operating at or near the maximum modulation rate (see Table 2). Turning the Throttle Screw in (clockwise) decreases the CO₂ concentration. Turning the Throttle Screw out (counterclockwise) increases the CO₂ concentration. Typical adjustment required is 0 – 1/2 of a turn in or out from the factory setting.



NOTE: Calibration of the Throttle Screw should only be performed with the burner operating at or near the maximum modulation rate (see Table 2).



Adjustments to the **Throttle Screw** may only be made by a qualified gas technician using a calibrated combustion analyzer capable of measuring CO₂ and CO. Adjustments may only be performed if the gas line pressure is maintained above minimum levels throughout the duration of the test (see Table 1). Failure to follow these instructions may result in serious injury or death.

Offset Screw Adjustment

The gas valve Offset Screw (see Figure 2) is used to calibrate the CO₂ offset at minimum modulation vs. maximum modulation. Turning the Offset Screw in (clockwise) increases the CO₂ concentration at minimum modulation rate. Turning the Offset Screw out (counterclockwise) decreases the CO₂ concentration at minimum modulation rate. Typical adjustment required is 0 - 1/8th of a turn in or out from the factory setting.



NOTE: Calibration of the Offset Screw must only be performed with the burner operating at the minimum modulation rate (see Table 2).

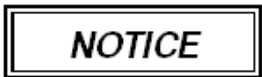


Adjustments to the **Offset Screw** may only be made by a qualified gas technician using a calibrated combustion analyzer capable of measuring CO₂ and CO, and only with the burner at the minimum modulation rate (see Table 2). Attempting to set the Offset Screw while the burner is operating at a modulation rate other than the minimum will result in incorrect combustion and may lead to burner damage or excessive CO.

Gas Line Pressure Test

The boiler gas valve is equipped with a line pressure test port; see Figure 2. Use the following procedure to measure the gas line pressure to the boiler to ensure it falls within the range given in Table 1:

1. Turn the supply of gas to the boiler off.
2. Open the bleed screw of the line pressure test port approximately 1-1/2 turns. This port is directly connected to the gas line feeding the boiler. See Figure 2.
3. Force 1/4" ID tubing over the housing of the line pressure test port; install the other end of the tubing to an appropriate line pressure test gauge or manometer. Ensure both ends of the tubing make a tight connection.
4. Open the supply of gas to the boiler and check for gas leaks.
5. Observe the line pressure under static conditions and compare it to Table 1. The pressure will be greatest under static conditions.
6. With all other gas appliances in the application running, operate the burner to the maximum firing rate (See Table 2) and compare the observed line pressure with Table 1. The pressure will be lowest during the maximum flow of gas.
7. Adjust the gas line pressure to ensure the parameters in Table 1 are attained under all conditions. If possible adjust the line pressure to the "Nominal/Desired" value listed in Table 1, while the unit is operating at the maximum modulation rate, see Table 2.
8. Continue observing the gas line pressure until the completion of the combustion analyses, in case adjustments need to be made.
9. Complete pressure testing, and then return the bleed screw of the Line Pressure Test Port to the closed position.



The line pressure is a function of the gas supply and is affected solely by field provided parameters such as line size and regulator settings. Under no circumstances can the boiler gas valve influence or be used to adjust the gas line pressure.



Failure to close the bleed screw of the Line Pressure Test Port will cause a severe leakage of gas, resulting in a fire or explosion causing property damage, serious injury or death.

Table 1 Line Pressure and Combustion Parameters

Gas	Line Pressure (inches w.c.)			CO ₂ (%)		CO (ppm) Max.
	Nominal/Desired	Min.	Max.	Min.	Max.	
Natural	7	4	10.5	8.5	9.5	175
Propane	11	8	13	10	11	175

Notes:

¹ Combustion calibration must only be performed with the burner operating at maximum modulation rate; when tested at minimum modulation rate the CO₂ must be 0.4-0.8% lower than CO₂ at maximum modulation rate.

Table 2 Minimum and Maximum Modulation Rates

Model	Min. Modulation Rate (RPM)	Max. Modulation Rate (RPM)
Lx400	1550	7250
Tft300	1500	5000
Tft399	1500	6900
Ti400	35 (gas input value)	195 (gas input value)

Note: For Tft & Lx models use *Diagnostic Test*, accessed from the *Diagnostic* menu of the display, to force max. and min. modulation rates; see Appendix A – Controller and Touchscreen Display Instructions, Section 5 DIAGNOSTICS PAGE.

Figure 2 Gas Valve and Venturi Assembly (Lx400 Illustrated)

